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AN EMPIRICAL STUDY OF CIVIL SERVANTS' LIFELONG E-LEARNING CONTINUANCE INTENTION

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Abstract

E-learning is an effective way for job-training and continuous education. In recognizing the need for civil servants to embrace the lifelong learning to sustain competitiveness, many countries around the world have created policies to develop e-learning. This study is focus on civil servants' e-learning continuance intention and through e-learning experience to achieve lifelong learning. Based on Information system (IS) success model proposed by Seddon (1997) and adding organizational factors (Incentive, Supervisor Support, and Technical Support) to survey civil servants' e-learning behaviour. The sample for the study was taken from the civil servants in Taiwan who have the experience of using the lifelong e-learning websites. The results also support Seddon's IS success model. Finally, the implications and limitations of the study are discussed.

Keywords: E-learning, Lifelong learning, Lifelong e-learning, continuance intention, information system (IS) success model.

1.Introduction

The 21st century is the new century of knowledge economy and also the e-century of network. With the development of the Internet and information technology in the era of knowledge-driven economy, e-learning is experiencing rapid growth and many companies and governments utilize it for training and education. E-learning has received considerable attention as a means of providing alternatives to traditional face-to-face, instructor-led education [1]. Today, governments are making great effort to adjust to the changing environment and to enhance their competitiveness. Most government agencies have made large investment in information technology to comply with the trend of e-government worldwide, such as Intranet, knowledge tank, knowledge platform, performance evaluation management system and so on. The goal is to build a good, sound environment for knowledge management.

E-learning is the convenient and effective way of learning as it overcomes the limits of time and space and contributes to knowledge expansion. It achieves borderless of global learning, and it's also the best way to achieve lifelong learning. Many countries implement e-learning system to train their civil servants and enhance national competitiveness. For example, the Korean government has saved 10 million US dollars since it invested in e-leaning system from 2001. In Singapore, the Civil Service College is the training institute for civil servants. There are about 120,000 personnel in the civil services in Singapore. As a policy, the civil service has stipulated that every civil service staff should attain about 100 hours of training every year. In order to implement the idea of lifelong learning and enhance the civil servants' competence, the government of Taiwan established the Civil Servants' Life-long Learning Passport System which was enforced from July, 2001. In 2007 every civil servants in Taiwan had to carry out at least 5 hours of e-learning courses. These learning records would be used as a reference of the year's performance appraisal and promotion by the human resource department. There are about 52 websites (belonging to 22 different government agencies) provide variety of e-Learning training courses for civil servants in Taiwan [2].

While numerous studies have focused on the e-learning but little topic is about civil servants' e-learning. Therefore, this research wants to understand the civil servants e-learning behavior after using the learning website, users' satisfaction, continuance intention, and other related factors to achieve lifelong learning. This study is based on Seddon (1997) [3] IS Success Model and adding

Organizational Factors (Incentive, Supervisor Support, and Technical Support) that influence the correlation of satisfaction and continuance intention. This study aimed to provide a theoretical basis and empirical evidence for predicting and explaining antecedents of civil servants' lifelong e-learning and to provide important guidelines for government when designing and implementing civil servants' lifelong e-learning.

2. Theoretical background

2.1 Lifelong learning and e-learning

E-learning has been defined as the use of information and communication technology to support and enhance learning and teaching [4]. E-learning is also a tool of lifelong learning and continuous education. In recent years, factors such as the knowledge-based economy, learning society and the rise of information technology have given rise to a consensus that lifelong learning is not only a norm, but also a culture and attitude [5] Learning is not restricted to classrooms and to formal learning in any learning institutions; it is an activity which happens throughout life, at work, play and at home. Nowadays, in the knowledge-intensive era, life-long competence development has become more important. People need to upgrade their skills not just at work but also in their daily lives.

There is an increasing demand for new approaches towards fostering life-long learning perspectives. Emergent Web 2.0 concepts and technologies are opening new doors for more effective learning and constituting an important strategy for enhancing public-sector efficiency. E-learning tools can be applied more effectively to human resources cultivation within the area of public sectors so as to help strengthen national competitiveness.

2.2 IS Success Model

The concept of IS success is widely accepted throughout IS research as the principle criterion for evaluating information systems [6]. Because IS success is a multi-dimensional concept that can be assessed at various levels, the measure for IS success has neither been totally clear nor exactly defined. However, DeLone and McLean in 1992 made a major breakthrough [7]. They comprehensively reviewed IS success measures proposed taxonomy and an interactive model as frameworks for conceptualizing and operational IS

success. That included six dimensions of success factors: system quality, information quality, use, user satisfaction, individual impact, and organizational impact. The original model did not empirically test. DeLone and McLean [8] also encourage further development and validity was needed for their taxonomy. Since 1992, a number of studies have explicitly tested the associations among the measures identified in the model [9][10][11][12][13, p.9]. Based on the DeLone and McLean [8] model, Seddon [3] proposed a respecification and extension of the DeLone and McLean of IS success model. Seddon's IS success model includes three columns of variables: (1) measures of information and system quality, (2) general perceptual measures of net benefits of IS use (including perceived usefulness and user satisfaction), and (3) other measures of net benefits of IS use (See Fig1). Seddon's IS success model focuses on the causal (variance) aspects of the interrelationships among the taxonomic categories, and separates the variance model of IS success from the variance model of behavior that occurs as a result of IS success. Seddon [3] also claimed that IS use is a behavior rather than a success measure, and incorporated the additional construct of perceived usefulness adapted from TAM. It replaced DeLone and McLean's IS "use" with "perceived usefulness" which serves as a general perceptual measure of net benefits of IS use [14]. Rai et al. [6] empirically and theoretically assessed the DeLone and McLean [8] and Seddon [3] models of IS success in a quasi-voluntary IS use context, and found that both the models exhibited reasonable fit with the collected data.

DeLone and McLean ten years after the publication of their original model and based on the empirical and theoretical contributions, they proposed an updated IS success model [15]. This model according the original model by combining the individual and organizational impacts as one dimension called "Net Benefits" and also adding another quality dimension called "Service Quality" to reflect the important of service and support in successful IS system. They suggested that intention to use may be employed as an alternative to use as a success dimension.

This study evaluates the current situation of civil servants' lifelong e-learning in Taiwan and focus on e-learning behavior research. We examine several IS success model and assume that the Seddon's IS success model can be better adapted to the civil servants' lifelong e-learning context.
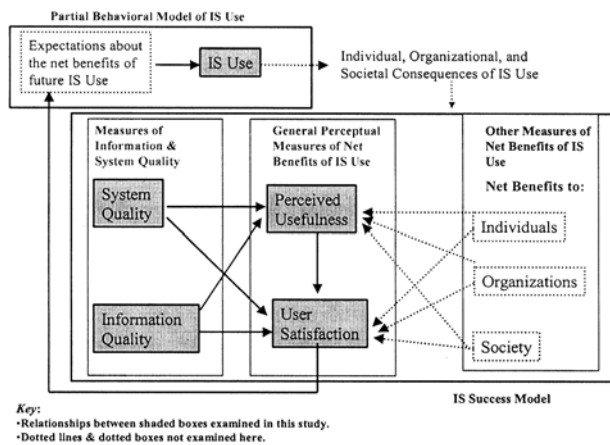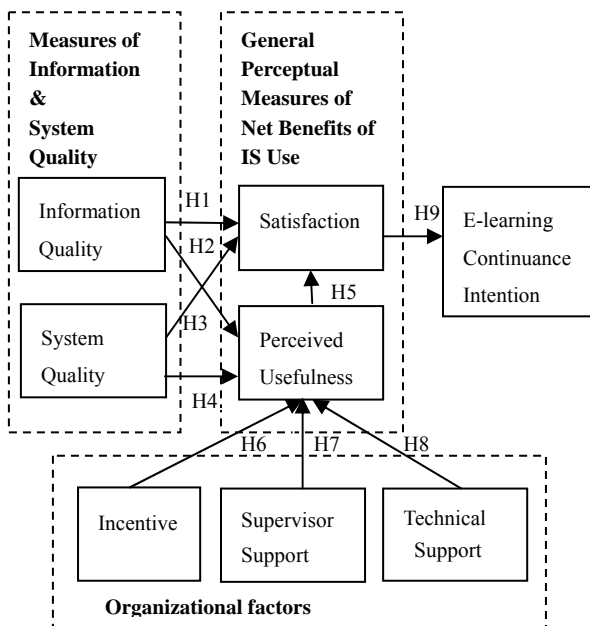
Fig.1. Seddon's IS Success model

3. The proposed model and research hypotheses

According to the literature background and based on IS Success Model and organizational factors. The relationships among these constructs are integrated in a conceptual model depicted in Fig. 2.

3. 1. Measures of Information and System Quality and General Perceptual Measures of Net Benefits of IS Use

Seddon [3] IS success model arranged the variance in three columns. First column was "measures of information and system quality" which was based on DeLone and McLean [8] 1992 original model. The second column was "general perceptual measures of net benefits of IS use" which including two perceptual measures "perceived usefulness and satisfaction". Perceived usefulness was based on David [16]. "The degree to which a person believes that using a particular system would enhance his or

her job performance". User Satisfaction is the most general perceptual measure of information systems success. The third column was "other measures of net benefits of IS use" which was a volitional-use setting, continued IS use (by individuals, organizations or society) is an indicator of net benefit [3]. This study mainly measures the variance of the Seddon's model first two columns (information quality, system quality, perceived usefulness, satisfaction) and then affect expectations about the net benefit of future IS USE. In this study the expectations about the net benefits of future IS Use was replaced with continuance intention.

Information quality refers to quality of the output, such as timeliness, scope, accuracy, format, completeness and relevance of information generated by and information [17][8][18]. Seddon [3] considers system quality to be concerned with "bug" in the system (system reliability), user interface consistency, ease of use, documentation quality, and quality and maintainability of the program code.

Chiu et al. [19] found perceived system quality has a positive effect on the behavioral intention to use the e-learning service. In the information system perspective, end user's satisfaction is a user's attitude toward the specific computer application system they utilized [20].

Several studies have found system quality and information quality have a direct effect on users' satisfaction [8] [9] [21]. Negash et al. [22] found that information and system quality determine satisfaction while service quality has no impact. Lederer et al. [23] found information quality to be a major influence on the perceived usefulness of websites. According to Seddon [3] the system quality is concerned mainly with the consistency of the interface and the ease of use. In the TAM, perceived ease of use has been found to influence perceived usefulness to use a new system [16]. Rai et al. [6] empirically and theoretically assess DeLone and McLean's [8] and Seddon's [3] models of information systems (IS) success in a quasi-voluntary IS use context and found that both model were supported and the testing of the Seddon's IS success model found that Information Quality and System Quality both influence users' satisfaction and perceived usefulness. Therefore, the following hypotheses are proposed:

H1: Information quality has a positive effect on civil servants' satisfaction of the lifelong e-learning system.
H2: Information quality has a positive effect on perceived usefulness while civil servants use of the lifelong e-learning system.

H3: System quality has a positive effect on civil servants' satisfaction of the lifelong e-learning system.

H4: System quality has a positive effect on perceived usefulness while civil servants use of the lifelong e-learning system.

3. 2.Perceived Usefulness and Satisfaction

Bhattacherjee [24][25] his studies suggested that perceived usefulness was a significant antecedent of users' satisfaction. Devaraj et al. [26] found that perceived usefulness were significant determinant of consumer satisfaction in the e-commerce environment. Roca et al., [27] based on the expectancy disconfirmation theory, found user satisfaction as impacted by perceived usefulness and. Therefore, the following hypotheses are proposed:

H5: Perceived usefulness has a positive effect on satisfaction while civil servants use the lifelong e-learning system.

3. 3. Incentives

Incentive described equivalently as rewards, can be structured to reward individual performance, team performance, or both, especially group-based incentives [28]. In the knowledge management success model which proposed by Kulkarni Ravindran and Freeze [29], incentive refer to formal appraisal and recognition of efforts by knowledge workers for furthering knowledge sharing and reuse and also a part of organizational support. People may expect that if they accomplish certain tasks, they will receive certain rewards. Naidoo & Leonard [30] indicate that there is a positive association between users' beliefs about the loyalty incentives of an e-service and their continuance intentions. Lai [31] found rewards will have a positive effect on perceived usefulness and intention to use knowledge management system. Martins and Kellermanns [32] in a study of business school students' acceptance of a web-based course management system found perceived incentive to use has a positive effect on perceived usefulness of the system. In this study, the civil servants' e-learning study hours have been a part of reference of organizational appraisal. Therefore, the following hypotheses are proposed:

H6: Incentive has a positive effect on perceived usefulness while civil servants use of the lifelong e-learning system.

3. 4. Supervisor support

Igbaria et al. [33] found that internal management support and external support were significant predicators of perceived usefulness of systems in small firm's personal computing acceptance. Igbaria et al. [34] indicated organizational support positively related to perceived usefulness of microcomputer usage. Lin and Wu [35] found that management support has a direct effect on perceived usefulness in small and medium enterprises computing acceptance. Karahanna and Straub [36] proposed and explanation for the psychological origins of usefulness and ease of use. The results indicated that system usage is affected through perceived usefulness and perceived ease of use by the degree of social influence exerted by supervisors. Therefore, the following hypotheses are proposed:

H7: Supervisor support has a positive effect on perceived usefulness while civil servants use of the lifelong e-learning system.

3.5. Technical Support

Technical support refers to availability of specialized personnel (e.g. help desk, information center) to answer user questions regarding IT usage, and provide instructional and/or hand on support to users before and during usage [37]. Prior studies have also highlighted the importance of computing support. Ndubisi and Jantan [38] found technical backing has a positive effect on perceived usefulness in Malaysian small and media size firms IS usage. Martins and Kellermanns [32] indicated that availability of technical support has a positive effect on perceived usefulness in the Web-based course management system.

Therefore, the following hypotheses are proposed:

H8: Technical support has a positive effect on perceived usefulness while civil servants use of the lifelong e-learning system.

3.6 Satisfaction and continuance intention

Satisfaction is an individual's feelings of pleasure or disappointment resulting from comparing a product's perceived performance (or outcome) in relation to his or her expectations. Past research has also indicated that satisfaction is positively related with future intention [39][40][41]. Bhatacherjee [25] found that consumers' continuance intention is determined by their satisfaction when using B2C e-commerce service. Chiu et al. [19] found that learners' satisfaction with e-learning was significantly associated with their continuance intention. Roca et al. [27] found that users' continuance intention is determined by satisfaction. Therefore, the following hypothesis is proposed:

H9: User's satisfaction has a positive effect on civil servants' e-learning continuance intention while use of the lifelong e-learning system.

4. Research Methodology

4.1. Sample and procedures

The sample for the study is taken from the civil servants in Taiwan who have the experience of using the lifelong e-learning websites. A total of 300 surveys were distributed to the civil servants from Taipei to Kaohsiung including district office, district health center, university, Tax administration and the county government since March 2009. A total of 228 surveys were returned in April 2009 and deleted 7 surveys because uncompleted or unusable, the effective questionnaires are 221 surveys with an effective response rate of 74 percent.

4.2 Instruments

The survey instruments consisted of 30 items to assess constructs of the proposed model. These items were adapted from previous studied and were refined to make them specifically relevant to the present study. System quality, Information quality and were using a scale adapted from DeLone & McLean [15] and C-M Chiu et al. [42], the items used to construct the perceived usefulness was based on the scale from Davis et al.[16] with some modifications. Incentive was measured using a scale adapted from Lai [31] and Martins & Kellermanns [32] with some modifications. Supervisor support was measured by five items adapted from Igbaria et al [33]. Technical Support adapted from Martins & Kellermanns [32]. Items related to satisfaction were adapted from C-M Chiu et al. [42]. E-learning continuance intention was adapted from prior work by C-M Chiu et al. [42]. These eight constructs were measured on a five-point Likert scale ranging from (1) "strongly disagree" to (5) "strongly agree". Investigate the civil servants' lifelong e-learning continuance intention.

5. Data Analysis and Results

5.1 Demographics and descriptive statistics

The returned sample characteristics are illustrated in Table 1. In this study a total of 300 questionnaires were distributed, of which 221 were effective and shows that the majority of the respondents of civil servants in terms of gender, age, position, education, working experience, online learning methods, online learning reasons, total of online learning hours over Last year (2008) and Estimating total of online learning hours this year (2009). 44.8% of the respondents were male, 55.2% were female, with 38.9% were 31~40 years old and 44.8% were 41~50 years old. 85.5% were not supervisors, 14.5% were supervisors. 80.1% had the bachelor degree. 83.7% working experience more than 6 years. 71.5% online learning methods were Internet access at

organization and 67% were using home Internet. The online learning reasons 84.6% were to acquire e-learning certificate records and 56.1% were to learn knowledge and growth.

Total of online learning hours over last year (2008) 31.2% were less than 10 hours. 27.1% were between 11-20 hours. 2009 estimating learning hours 21.7% are less than 10 hours and 26.7% between 11-20hours. Compared to 2008, the estimating total of online learning hours this year (2009) of the respondents, the learning hours has slightly increased.

Table1 Demographic Profiles of the Respondents

Table1 Demographic	Categories	Total (N=	Statistics
Gender	Male	99	44.8%
	Female	122	55.2%
Age	Younger than 30	15	6.8%
	31~40 years old	86	38.9%
	41~50 years old	99	44.8%
	51 years or older	21	9.5%
Position	Supervisor	32	14.5%
	Not supervisor	189	85.5%
Education	High school	13	5.9%
	Bachelor	177	80.1%
	Master	31	14.0%
Working Experience	Less than 2	6	2.7%
	2~5 years	30	13.6%
	6~10 years	45	20.4%
	11~15 years	61	27.6%
	16~20 years	49	22.2%
	More than 21	30	13.6%
Online learning methods	Using	158	71.5%
	Home Internet	148	67.0%
	Internet Café	0	0
	Others	2	0.9%
Online learning reasons	To acquire	187	84.6%
	To learn	124	56.1%
	Curious	8	3.6%
	To kill time	5	2.3%
Total of online learning hours 2008	Less than 10	69	31.2%
	11-20 hours	60	27.1%
	21-40 hours	44	19.9%
	41-60 hours	15	6.8%
	More than 60	33	14.9%
Estimating total of online learning hours 2009	Less than 10	48	21.7%
	11-20 hours	59	26.7%
	21-40 hours	50	22.6%
	41-60 hours	32	14.5%
	More than 60	32	14.5%

5.2 Data Analysis

This research has adopted structural equation modeling (SEM) for its data analysis to study the causalities among all parameters constructed in each model. The estimation of the parameters uses the maximum likelihood estimation (MLE), and the

sample size cannot be too small when utilizing this. In order to be suitable for MLE, it is generally acknowledged that the sample size should lie at least somewhere from 100 to 400 [43]. The sample size was 221, meeting the requirement. The statistical analysis software used for the research was LISREL 8.50 and SPSS 17.0. When carrying out analysis with SEM, a two-phased approach was used, based on Anderson & Gerbing [44]. The first step involves the analysis of the measurement model, while the second step tests the structural relationships among latent constructs.

5.3 Analysis of validity and reliability

The reliability and validity of the measurement instrument was evaluated using reliability and convergent validity criteria. Reliability and validity of the survey instruments were established by calculating composite readability (CR) to measure internal consistency. Additionally, the convergent validity of the scales was verified using two criteria suggested by Fornell & Larcker [45]: (1) all indicator loadings should be significant and exceed 0.7; and (2) average variance extracted (AVE) for each construct should exceed the variance because of measurement error for that construct (i.e. AVE should exceed 0.50).

As shown in Table 2, composite readability values were above the recommended level of 0.7 and AVE ranged from 0.64 to 0.77 (See Table3), exceeding the minimum value of 0.50. All of the factor loadings of the items in the research model were greater than 0.70. Thus, all factors in the measurement model had adequate reliability and convergent validity.

Table 2 Summary of measurement scales

Constructs/factors	Indicators	Composite reliability	Mean (S.D.)	Loading	Source
Information Quality(IQ)	IQ1	0.91	3.46 (0.70)	0.80	DeLone & McLean
	IQ2		3.44(0.73)	0.76	(2003)
	IQ3		3.48(0.68)	0.82	C-M Chiu et al. (2007)
	IQ4		3.47 (0.66)	0.81	
	IQ5		3.35(0.71)	0.91	
System Quality (SQ)	SQ1	0.90	3.48 (0.71)	0.85	DeLone & McLean
	SQ2		3.48(0.63)	0.85	(2003)
	SQ3		3.70(0.63)	0.70	Wu & Wang (2006)
	SQ4		3.50(0.70)	0.81	C-M Chiu et al. (2007)
	SQ5		3.48(0.66)	0.78	
Perceived Usefulness(PU)	PU1	0.931.	3.19 (0.72)	0.83	Davis et al.(1989)
	PU2		3.19 (0.71)	0.80	
	PU3		3.34 (0.71)	0.89	
	PU4		3.39 (0.70)	0.88	
	PU5		3.52 (0.66)	0.84	
Satisfaction(SA)	SA1	0.88	3.61(0.72)	0.83	C-M Chiu et al. (2007)
	SA2		3.52(0.70)	0.85	
	SA3		3.41(0.76)	0.85	
Incentive	IN1	0.87	3.38(0.93)	0.76	Martins &
	IN2		3.14(0.86)	0.95	Kellermanns(2004)
					Lai(2009)
Supervisor Support	SS1	0.88	3.28(0.80)	0.75	Igbaria et al (1997)
	SS2		3.40(0.78)	0.75	
	SS3		3.32(0.81)	0.85	
	SS4		3.32(0.77)	0.85	
Technical Support	TS1	0.85	3.34(0.81)	0.87	Martins &
	TS2		3.30(0.83)	0.81	Kellermanns(2004)
	TS3		3.45(0.75)	0.75	Lee & Kim(2009)
Continuance Intention(CI)	CI1	0.91	3.72(0.62)	0.81	
	CI2		3.53(0.65)	0.90	C-M Chiu et al. (2007)
	CI3		3.50(0.67)	0.91	

Table 3 Correlations and AVE

Construct	AVE	IQ	SQ	PU	IN	SS	TS	SA	CI
IQ	0.67	**0.82**							
SQ	0.64	0.60	**0.80**						
PU	0.72	0.46	0.56	**0.85**					
IN	0.77	0.20	0.21	0.19	**0.88**				
SS	0.64	0.38	0.47	0.40	0.28	**0.80**			
TS	0.66	0.47	0.52	0.47	0.15	0.72	**0.81**		
SA	0.71	0.44	0.55	0.57	0.13	0.31	0.38	**0.84**	
CI	0.77	0.39	0.50	0.51	0.11	0.39	0.43	0.77	**0.87**

Diagonal elements (in bold) are the square root of the average variance extracted (AVE). Off-diagonal elements are the correlations among constructs.

According to Fornell and Larcker (1981), discriminant validity can also be tested among all constructs by comparing the average variance extracted (AVE) of each construct with the squared correlation of that construct and all the other constructs. As shown in Table 3, the square root of average variance extracted for each construct is greater than the correlations between the constructs and all other constructs. The results suggested an adequate discriminant validity of the measurements.

5.4 Measurement Model Fit Analysis

The first step in model estimation involved examining the model fit. To validate the measurement model, this study used LISREL 8.50 to assess the analysis. For a good model fit, the Chi-square value normalized by degrees of freedom (x^2/d.f.) should not exceed 3, goodness of fit index (GFI) should exceed 0.8, adjusted goodness of fit index (AGFI) should exceed 0.8, normed fit index (NFI), Incremental index of fit (IFI) and comparative fit index (CFI) should exceed 0.9, and root mean square error of approximation (RMSEA) should not exceed 0.08. For our CFA model, x^2/d.f. was 1.46 (x^2 = 459.30; d.f. =314), GFI was 0.88, AGFI was 0.82, NFI was 0.97, IFI was 0.99, CFI was 0.99, and RMSEA was 0.046,As shown in Table 4, the goodness-of-fit indices are all within accepted thresholds. Therefore, the summary of the overall goodness-of-fit indices indicate an adequate fit of the model and data.

Table 4 Fit Indices for the Structural Model

Structural Model Statistic	Fit Indices	Recommended Threshold
x^2/ d.f.	1.46	≤3.0
Goodness-of-fit index (GFI)	0.88	≥0.8
Adjusted GFI (AGFI)	0.82	≥ 0.8
Normed fit index (NFI)	0.97	≥ 0.9
Incremental index of fit (IFI)	0.99	≥ 0.9
Comparative fit index (CFI)	0.99	≥ 0.9
Root mean square error of approximation (RMSEA)	0.046	≤ 0.08

5.5 Structural Model Analysis

The second step in model estimations was to examine the significance of each hypothesized path in the research model, as well as the variance explained (R^2) by each path. The results of testing the structural model are presented in Table 5 and a graphical presentation of the results is shown in Fig.3. The explanatory power of the research model is also shown in Fig.3. The R^2 value showed that civil servants' lifelong e-learning continuance intention explained by the model is 75 percent. Furthermore, users' satisfaction accounting for 55 percent and perceived usefulness accounting for 53 percent are all significant determinants of civil servants' lifelong e-learning continuance intention.
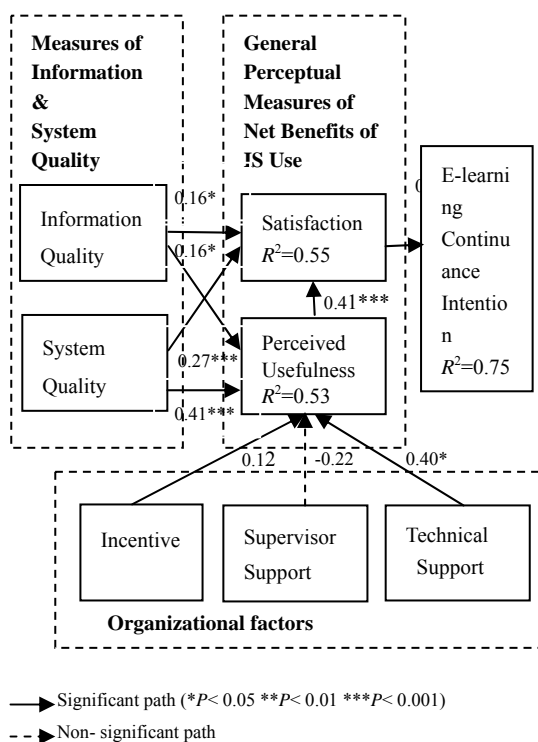

Fig 3 SEM analysis of the research model
Table 5 Results of Hypothesis Testing

Hypothesis		Standardized Path	t-value	Results
H1	IQ →	0.16*	2.33	Supported
H2	IQ →	0.16*	2.27	Supported
H3	SQ	0.27***	3.39	Supported
H4	SQ	0.41***	5.02	Supported
H5	PU →	0.41***	4.86	Supported
H6	IN →	0.12	1.98	Supported
H7	SS →	-0.22	-1.20	Not supported
H8	TS →	0.40*	2.03	Supported
H9	SA →	0.87***	13.81	Supported

6. Discussion

This study showed that the Seddon's IS success model was well suited to survey civil servants' lifelong e-learning continuance intention. Using Structural Equation Modeling (SEM), the hypotheses are proposed to validate the fit of empirical data and model. Several key findings emerge from the study. First, General Perceptual Measures of Net Benefits of IS Use two key factors "users' satisfaction and perceived usefulness" which are two important predictors of civil servants' lifelong e-learning continuance intention. This study provides a good explanation of Users' Satisfaction and Perceived Usefulness .Satisfaction was explained (55%) and Perceived accounted for 53%. Also, Information and System Quality are two most significant determinants toward Satisfaction and Perceived Usefulness.

Second, Supervisor Support does not have positive effect on perceived usefulness. The possible explanation that may account for the civil servants' lifelong e-learning is just on the early stage in Taiwan. Although the organization plays an important role in supporting e-learning, most of the public sectors' supervisors focus more on employees' hard working and efficiency and sometimes it could be a pressure that hinders e-learning implementation.

Third, Technical Support is the important antecedent of e-learning continuance Intention; the government authorities can increase users' usage intention by improving technical support and employ training and promotion approaches which in turn influence the civil servants' behavior intention to consist using lifelong e-learning systems.

Fourth, the results also illustrate that Incentives was critical factors in affecting Perceived Usefulness. In this study about 85% civil servants' e-learning reasons are to acquire learning certificates. This indicates currently most of the civil servants e-learning reasons are not self-direct learning but due to their organizational regulations or they concerned more about that learning certificates are a part of year

appraisal. In order to promote civil servants' lifelong e-learning, the incentives strategy needs to be continued. The e-learning hours should be a part of consideration of civil servants' year apparel and continue promoting to motivate more civil servants autonomous learning.

7. Limitations and future research

There are several limitations in this study. First, the investigation of civil servants lifelong e-learning is relatively new and the government is on the early stage of promoting lifelong e-learning in Taiwan. Second, In Taiwan, the civil servants' lifelong e-learning portal did not totally integrate. There are about 52 of the websites and the quality of the websites is not equal. Therefore, different e-learning websites have different system quality and information quality. Third, there are only 221 valid responses to the survey. If more valid questionnaires were received, the result may be more representative. Beside, future research can increase the sample size and a higher response rate for a more complete research. In addition, some of the civil servants think that civil servants lifelong e-learning is a compulsive learning. They want to learn it because the organizational regulation.

The future studies can consider more variables in the research instruments, such as extrinsic and intrinsic motivation, self-direct learning, computer literacy; organization culture, subjective norm or social pressure and performance etc. It also can conduct observation approach, in-depth interviewing and qualitative approach for more understanding the learning behaviors and attitude. Finally, longitudinal studies are also required to observe the civil servants continuous or discontinuous use the lifelong e-learning systems.

8. Implications and Conclusions

This study presents significant progress toward explaining the factors affecting civil servants' lifelong e-learning continuance intention. This study has investigated the underlying relationship between system quality, information quality, incentive, supervisor support, technical support, perceived usefulness, satisfaction and e-learning continuance intention for civil servants' lifelong e-learning behavior. The empirical examination was using a structural model based on Seddon's IS success model has been tested and validated. Most of the causal relationships between the constructs postulated by the structural model are well supported.

An empirical study was conducted to identify determinants of civil servants' e-learning continuance intention. The findings of the present study have various implications. First, perceived usefulness and satisfaction are critical to the success of civil servants lifelong e-learning system.

Second, technical support was a significant mediator of the effects of perceived usefulness. Third, incentive has positive effects on perceived usefulness. Finally, based on the research findings, hoping the government can continue implement civil savants' lifelong e-learning and future research can conduct a deeper research on civil servants' lifelong e-learning behavior and related factors.

The academic value of this study is fourfold. First, this study proposed a comprehensive theoretical framework to identify determinants of civil servants' lifelong e-learning continuance intention. Second, the sample was real civil servants. Thus, the validity of the findings is not limited. Third, lifelong e-learning not only can apply to civil servants' training and education but also in adult learning and organization learning. Finally, based on Seddon's IS success model and organizational factors, this study confirmed that the proposed model has a high explanatory power for continuance intention.

In the 21st century which is full of unknowns, challenges, and infinite possibilities, knowledge and learning are the cores for sustainable development and continuous progress of the society. With the desire to enhance government's performance and to remain competitive in this global village, the need for incorporating ICT and effective ways of training among civil servants has become inevitable.

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